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We used a pressure membrane extractor (Model 1020, Soil Moisture Equipment Corp.) to study the silica content at equilibrium with the decreasing pore sizes of amorphous silica. The principle is to extract the aqueous solution through a sequential process from the larger (micrometric) pores to the thinner (some nm) pores. Each extraction step is followed by an equilibration period.

The measurements confirmed earlier observations [1,2] that the concentration in dissolved silica decreases when the extraction pressure increases. The direct conclusion is that the silica solubility is pore-size dependent. These results are interpreted with the Young-Laplace relationship, at constant silica-solution surface tension, which means to attribute an elasto-capillary pressure to the solid.

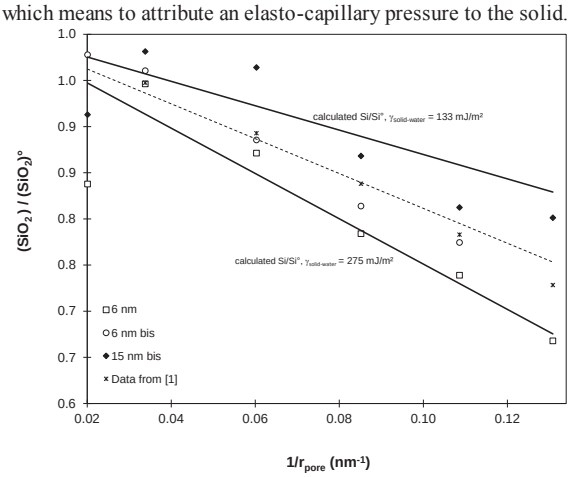

Figure 1: Decreasing silica solubility extracted from pores having decreasing radii.

The geological implication can be illustrated using a simple scheme (e.g. [3]), wherein aquifer compartments with changing pore sizes are successively put along a flowing line (in series). Depending on the modeling assumption (pore sizes, succession type, equilibrium state of the solution), this process can result in a preferential cementation of the thin or the large pores.

Our experiments demonstrate that the negative curvature of the solids has a geochemical feed-back on the solid-solution interactions, with a threshold size at around 0.1 μm.

[1] Dandurand J.-L., Mizele J., Schott J., Bourgeat F., Valles V., and Tardy Y. (1982) *Sci. Géol. Bull.* **35**, 71−79. [2] Emmanuel S. and Berkowitz B. (2007) *Geophys. Research Letters* **34**, L06404. [3] Mizele J., Dandurand J.-L., and Schott J. (1985) *Surf. Sci.* **162**, 830-837.